EPPO Datasheet: *Ipomovirus cucumisvenaflavi*

Last updated: 2023-03-20

IDENTITY

Preferred name: *Ipomovirus cucumisvenaflavi*
Taxonomic position: Viruses and viroids: Riboviria: Orthornavirae: Pisuviricota: Stelpaviricetes: Patatavirales: Potyviridae
Other scientific names: *CVYV, Cucumber vein yellowing ipomovirus, Cucumber vein yellowing virus*
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EPPO Categorization: A2 list
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EPPO Code: CVYV00



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Notes on taxonomy and nomenclature

CVYV is more closely related to Sweet potato mild mottle ipomovirus than any other virus in the family Potyviridae (Lecoq *et al.*, 2000; Desbiez *et al.*, 2001). Isolates of CVYV from Israel and Jordan induce similar vein-clearing symptoms in cucumber and melon, but the isolates from Jordan cause more severe stunting in cucumber (Lecoq *et al.*, 2000). CVYV isolated from cucumber in Spain had a nucleotide sequence which was 95.6% identical to the sequence published for the isolate from Israel. A population of CVYV, which differs from the Middle Eastern and Spanish populations based on phylogenetic studies, has been found in samples collected from Sudan between 1992 and 2012, suggesting that virus has long been endemic in sub-Saharan Africa (Desbiez *et al.*, 2019).

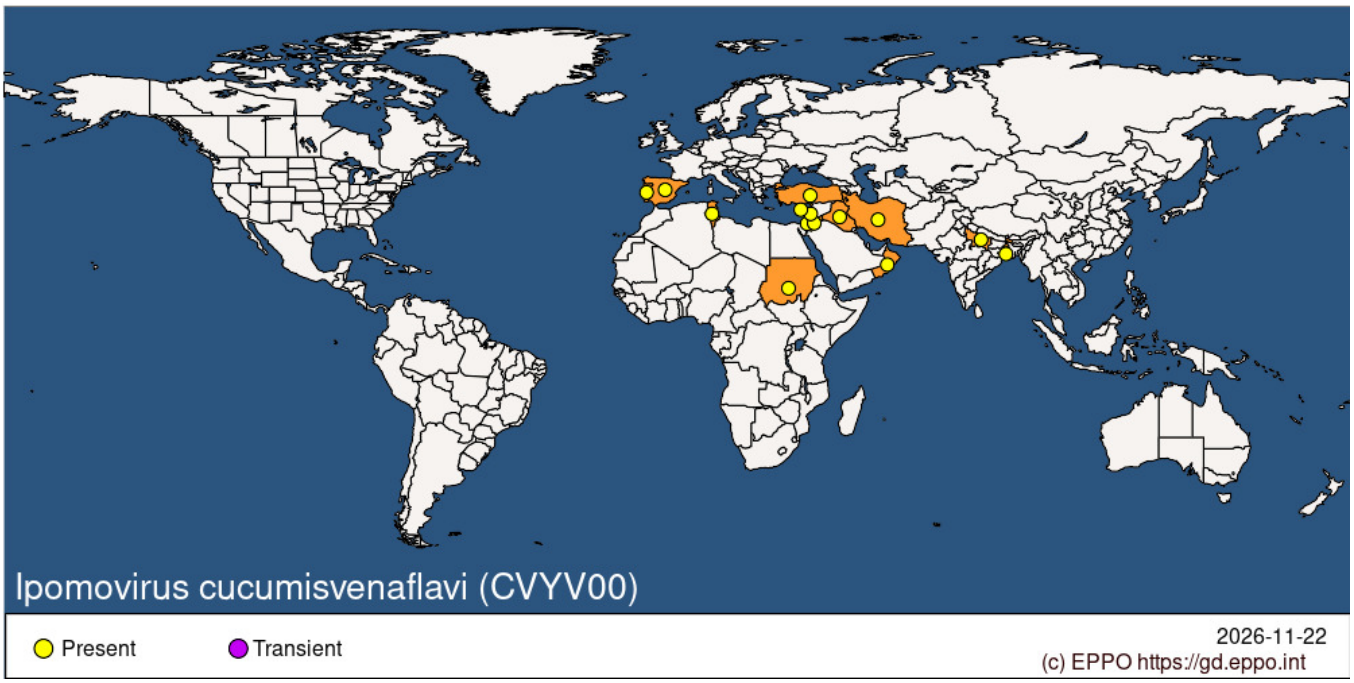
HOSTS

CVYV naturally infects cucumber (Cohen & Nitzany, 1960), melon (Yilmaz *et al.*, 1989), watermelon (Janssen & Cuadrado, 2001) and courgette (Anon, 2001). Weeds are also reported as hosts in Jordan (Mansour & Al-Musa, 1993), and in Spain (Janssen *et al.*, 2002). Experimental hosts have been studied using mechanical inoculation of cotyledons and inoculation by the white?y vector *Bemisia tabaci* (Cohen & Nitzany, 1960; Al-Musa *et al.*, 1985; Yilmaz *et al.*, 1989; Mansour & Al-Musa, 1993).

Host list: *Citrullus colocynthis, Citrullus lanatus, Convolvulus arvensis, Cucumis melo var. flexuosus, Cucumis melo , Cucumis sativus, Cucurbita pepo var. giromontiina, Cucurbita pepo, Ecballium elaterium, Lagenaria siceraria, Luffa sp., Malva parviflora, Sonchus asper, Sonchus oleraceus, Sonchus tenerrimus*

GEOGRAPHICAL DISTRIBUTION

CVYV is present in several countries from the Mediterranean area, Africa and Asia.



EPPO Region: Cyprus, Israel, Jordan, Portugal (mainland), Spain (mainland), Tunisia, Türkiye
Africa: Sudan, Tunisia
Asia: India (Uttar Pradesh, West Bengal), Iran, Islamic Republic of, Iraq, Israel, Jordan, Lebanon, Oman

BIOLOGY

CVYV is transmitted by the white?y *Bemisia tabaci* (Cohen & Nitzany, 1960) in a semipersistent manner (Harpaz & Cohen, 1965; Mansour & Al-Musa, 1993). Adult insects acquire the virus by sucking on phloem sap for at least 30 min, and can further transmit it to another plant when feeding. The virus does not circulate or replicate in the insect and transmission efficiency decreases after 4-12 h (Harpaz & Cohen, 1965; Dombrovsky *et al*., 2014; Desbiez *et al*., 2019).

The aphids *Aphis gossypii* and *Myzus persicae* are not vectors (Cohen & Nitzany, 1960).

There is no evidence for seed transmission for CVYV or other *Ipomovirus* species (Dombrovsky *et al*., 2014).

CVYV is systemic in its natural hosts. It survives in weed hosts (Mansour & Al-Musa, 1993; Janssen *et al.*, 2002), and in volunteer plants of crop hosts.

DETECTION AND IDENTIFICATION

Symptoms

In cucumber, CVYV causes pronounced vein clearing, chlorosis and ?nally general necrosis of the affected plant (Cohen & Nitzany, 1960). Light to dark green mosaic is observed on fruit (Anonymous, 2001). Non-parthenocarpic cucumbers have been reported to be symptomless carriers of CVYV while parthenocarpic cucumbers develop severe symptoms. Symptoms in both cucumber and melon have been described as vein yellowing, vein clearing and stunting with a corresponding yield reduction (Yilmaz *et al*., 1989). Sudden death was observed in melon crops in Spain (Janssen & Cuadrado, 2001). In watermelon, symptoms are often inconspicuous or not expressed (Anon, 2001). Occasional splitting of fruits has been observed (Janssen & Cuadrado, 2001). In courgette, there is a wide range of symptoms, from chlorotic mottling to vein yellowing, or no symptoms (Anon, 2001). In Spain, symptoms are considered to be increased by synergistic reactions between different viruses (Gil-Salas *et al*., 2011). Pinwheel-shaped cytoplasmic inclusions (typical of the *Potyviridae*) have been seen in electron microscopic studies of cells from CVYV-infected plants (Lecoq *et al*., 2000).

Morphology

Studies of the virus have revealed rod-shaped particles 740–800 nm long and 15–18 nm wide. The virus is estimated to have a sedimentation coefficient of about 220 S (Sela *et al*., 1980). Although it was first proposed that the viral nucleic acid of CVYV was double-stranded DNA (Sela *et al*., 1980) and later double-stranded RNA (Lecoq *et al.* , 2000), it is now clear that it is a positive-sense single-strand RNA (Dombrovsky *et al*., 2014).

Detection and inspection methods

Vein clearing or vein yellowing of cucumber and melon is considered to be a distinctive symptom of CVYV. Molecular tests are available to detect CVYV (Martínez-García *et al*., 2004; EPPO Diagnostic Protocol PM 7/81, 2007).

PATHWAYS FOR MOVEMENT

In international trade, CVYV is most likely to be carried by infected vegetative host material, such as seedlings. *B. tabaci* will spread CVYV locally.

Because CVYV is semipersistent in its white?y host and is retained for less than 12 h (Desbiez *et al*., 2019), *B. tabaci* is only likely to spread CVYV long distance if it is carried on infected host material. *B. tabaci* carried on non-host plants may not remain viruliferous for long enough to transmit the virus. CVYV is not known to be seed-borne.

PEST SIGNIFICANCE

Economic impact

The cucumber disease caused by CVYV was first observed in the late 1950s in the Jordan valley area of Israel during the warm autumn growing season where it was reported to be severe and damaging. At that time, it had not been recorded in the cooler regions of Israel or during other seasons in the Jordan Valley (Cohen & Nitzany, 1960). In 1985, CVYV was recorded as present in the Jordan Valley in Jordan, but no indication of damage in this country has been given except that the virus stunted parthenocarpic cucumbers grown under plastic and that it was the most frequent viral disease of that crop (Al-Musa *et al*., 1985; Mansour & Al-Musa, 1993). Mansour (1994) reported that, in 1992, CVYV was detected in 43% of tested samples collected from cucumber crops grown under plastic. Similarly, the presence of CVYV on cucumber and melon in Turkey was not accompanied by information on crop damage other than a description of symptoms (Yilmaz *et al*., 1989). However, CVYV has been described as a widespread and severe disease of cucurbits in the eastern Mediterranean basin (Lecoq *et al*., 2000) and considerable losses were reported from Spain during the first outbreak (Cuadrado *et al*., 2001b). In autumn 2000, CVYV was considered important enough for the Spanish authorities to destroy affected plants covering 70 ha of glasshouses in an attempt to suppress further spread (Cuadrado *et al*., 2001a). Occasional splitting of watermelon fruits has been observed in Spain (Janssen & Cuadrado, 2001), and in Portugal (Louro *et al*., 2004).

Control

Preventive and cultural practices are used to control CVYV. Commercial resistant cucumber varieties are available (Pico *et al*., 2003; Gil-Salas *et al*., 2009). Potential resistance sources have been identified in melon but are not used commercially (Pitrat *et al*., 2012); there are no report of resistance in watermelon (Velasco *et al*., 2020). Care should be taken to protect cucumber or melon seedlings from infection before transplanting in the field or under plastic. The seedlings should be grown in a white?y free environment.

In protected crops in Spain, control relies on preventive and cultural practices: use of pest-free seedlings, adequate glasshouse window screens, double doors, treatment of infected vegetable residues and the introduction of a rest period of at least one month between two cucurbit crops and monitoring of *B. tabaci* populations (Velasco *et al*., 2020).

When preventive and cultural methods are not sufficient, control of CVYV rely on the control of its white?y vector *B. tabaci*. Regarding chemical control, *B. tabaci* appears to develop resistance to all groups of plant protection products that have been developed for its control. Rotation of insecticides that do not lead to cross resistance should therefore be used to control *B. tabaci* infestations. The parasite *Encarsia formosa* is used as a biological control agent to control *T. vaporariorum*, but it is less efficient against *B. tabaci*. Repeated introductions of larger numbers of *E. formosa* than *B. tabaci* are necessary if eradication is required. The predatory mite *Amblyseius swirskii* can limit *B. tabaci* populations in cucurbit crops by feeding on *B. tabaci* eggs (Tellez *et al*., 2017).

Phytosanitary risk

CYVV has been present in countries of the eastern Mediterranean area since the 1960s, and was found in Portugal, Spain and Tunisia in the 2000s. It can establish in areas where *B. tabaci*, its white?y vector, is established. *B. tabaci* is present outdoors in many Southern European countries and is a glasshouse pest in some Northern European countries. Cucumber is grown throughout the EPPO region, while melons and watermelons are most commonly grown in Mediterranean countries. In 2003, CVYV was considered to have the potential to become a serious disease of cucurbits in the EPPO region. However, as of 2023, it has not become a major pest. The use of CVYV-resistant commercial cucumber cultivars, and the measures applied against *B. tabaci* and other whitefly-transmitted viruses may have helped reduce its impact.

PHYTOSANITARY MEASURES

International trade in young cucurbit plants for planting seems the main pathway, but little information has been found on movements into or within the EPPO region. It is not clear how likely it is that seedlings would become infected, but they should presumably be protected from infection before entering trade. Visual inspections of export material may not detect the virus since it is latent in some hosts and may take some time to express symptoms in others. Suitable measures would ensure, for plants for planting of cucurbits from areas where CVYV occurs, crop or place of production freedom from the virus and exclusion of the vector *B. tabaci*.

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Datasheet history

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